UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,635	10/04/2006	Amnon Shashua	1300.0002	2082

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EXAMINER
BROOKS, JULIAN D

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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	Application No.	Applicant(s)
Office Action Summary	10/599,635	SHASHUA ET AL.
	Examiner	Art Unit	
	JULIAN D. BROOKS	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>10/04/2006</u>.
2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-12</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) <u>1-12</u> is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on <u>10/04/2006</u> is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All   b) ☐ Some * c) ☐ None of:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>03/29/2007</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____ .

DETAILED ACTION

1.   Claims 1-12 are pending in this application [10/04/2006].

Priority

2.   Acknowledgment is made that this application is a national stage filing under 35

U.S.C. 371 of international application no. PCT/IL05/000381 filed on **04/07/2005**.

Applicant's further claim for domestic priority under 35 U.S.C 119(e) is

acknowledged based on the provisional application **60/560050** filed on 08/08/2004.

Information Disclosure Statement

3.   The information disclosure statement (IDS) submitted on 03/29/2007 is in

compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure

statement has been considered and a copy is enclosed within this office action.

Drawings

4.   The Drawings filed 10/04/2006 are approved for Examination purposes.

Specification

5.   The specification is objected to as failing to provide proper antecedent basis for

the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction

of the following is required:

a.   Claim 6 recites a "second training of a holistic classifier". However no

where in applicant's specification is a "second training" disclosed, or discussed.

Page 16, lines 1-6 discuss "second round classifications", however this in no way

constitutes a "second training of a holistic classifier" in this cited portion of the

specification a "random" classifier, which not only is never identified or defined as

holistic, but also it is not even being trained but instead used for classification.

Appropriate correction is required.

b.   Claim 7 recites "third training of a holistic classifier". However no where in

applicant's specification is a "third training" disclosed, or discussed as similarly

explain with the above claim 6.

c.   Claim 8 also makes reference to a "third training".

As best understood by the Examiner, for compact prosecution, the claimed

"second" and "third" training are interpreted as "secondly, training a holistic classifier"

and "thirdly, training a holistic classifier" as to indicate a number of training limitations in

general, not with specific regard to just the holistic classifier. Appropriate correction is

required. **NO NEW MATTER MAY BE ADDED.**

Claim Objections

6.   Claims 1-4 and 6-8 are objected to because of the following informalities:

     a.   The claims recite improper parenthesis use such as: "(CBDS)", "(a)", "(b)", "(c)", etc. Examiner notes that the use of parentheses is improper because parentheses are only used when reference characters, corresponding to elements recited in the detailed description of the drawings, are included in claims. The parentheses are used to avoid confusion with other numbers or characters which may appear in the claims. See MPEP §608.01(m). However, in this instance the parentheses do not enclose any drawing reference characters and therefore, should not be enclosed by parentheses. Examiner suggests removing the parenthesis "(...)" and replacing with a different type of symbol if the identifiers are truly considered necessary. Appropriate correction is required.

     b.   Claim 8 also recites "using an Adaboot algorithm"; however Examiner believes this to be a typographical error which should recite "using an Adaboost algorithm".

Appropriate correction is required. NO NEW MATTER MAY BE ADDED.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3.   Claims 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "second training a holistic classifier" in line 2 of the claim; however, there is insufficient antecedent basis for this limitation in the claim. The recitation of "second training" implies and requires there to be a first or initial training of the holistic classifier, however nowhere in this claim or claim 4, from which is depends, is there a recitation of an initial or first training of a holistic classifier. Therefore, this limitation is unclear and indefinite.

Claim Rejections - 35 USC § 101

4.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5.   Claims 4-12 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. Specifically, the claims recite such steps as "providing..., selecting..., using..., and training...", however, for example these steps can be performed manually/mentally by a human being, and thus would not be tied to another statutory category. The body of the claims must positively recite using the particular hardware machine such as a processor, computer, circuitry, etc, (whatever is disclosed) that is used to perform the significant and inventive steps of the claimed method, and thus tying the claim to the statutory category of machine. Furthermore, nor do the claims appropriately transform the underlying subject matter as required. The claims need to obtain data that represents a physical object, modify/produce calculated information from this data, and finally create an external depiction that represents the modified/produced calculated information/data, (an external depiction, for example, can be but is not limited to visually displaying the modified data/calculated information). Particularly the present claims fail to create an external, real world realized representation of the trained classifiers. (For example, some type of externally realized actuation in response to the classifiers being trained and used to detect people in images). NO NEW MATTER MAY BE ADDED.

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7.   **Claims 1-7, and 10-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Mohan et al., "Example-based object detection in Images by Components", published April 2001, [herein Mohan].**

With respect to claim 1, Mohan discloses "A component based detection system (CBDS) which operates to detect presence of at least one person in an image of a region of interest in an environment" (Page 349, Section 1, Col. 1, lines 1-6, and Col. 2, lines 3-5),

"the component based detection system (CBDS) comprising: (a) a set of training images" (Page 351, Col. 1, lines 9-12, Pages 351-352, bridging paragraph, Page 355, Figure 5 plus caption and Section 3.1, lines 8-27); and

"(b) a plurality of training subsets selected from said set" (Page 351, Section 2.1, lines 8-13, & 3-6, Pages 351-352, bridging paragraph, Figure 2, Page 354, col. 1, lines 1-5 and Figure 4, training subsets corresponds to Mohan's head, leg, arm, etc. images from the plurality of training images), "wherein at least a portion of said training subsets includes positive training images which comprise at least one image portion of at least one person" (Page 354, col. 1, lines 1-5 and Page 352, Figure 2), "wherein each of said positive training images include a characteristic trait different from the characteristic traits of the other training subsets" (See Figure 2 and Page 351, col. 1, lines 9-12, Mohan's different body part images are used to train only one classifier, different body

parts train different classifiers, therefore each body part set differs from the other sets by the body part that is imaged);

"wherein each said training subset is used to respectively train a plurality of component classifiers to recognize at least a portion of said image of the at least one person in each of a plurality of sub-regions of the region of interest" (See Figure 2 and Page 351, col. 1, lines 9-12, and Page 354, Figure 4).

With respect to claim 2, Mohan discloses "wherein at least a portion of said training subsets includes negative training images which do not comprise any image portion of at least one person, wherein each of said negative training images include a characteristic trait different from the characteristic traits of the other training subsets" (Page 354, Col. 1, lines 1-8, and Page 355, Section 3.1, lines 20-22, different characteristic trait corresponds to the negative images' lack of people and therefore, body parts).

With respect to claim 3, Mohan discloses "further comprising: (c) a holistic classifier which is trained to combine respective assessments from said component classifiers and provide a global assessment whether the at least one person is present in the region of interest" (Page 351, Section 2.1, lines 5-8, Page 352, Section 2.2.2 & Figure 2, and Page 355, Section 3.1, lines 1-6, and Section 3.1.1, lines 1-9, holistic classifier corresponds to Mohan's combination classifier).

With respect to claim 4, Mohan teaches "A component based detection method which detects presence of at least one person in an image of a region of interest in an environment" (Page 349, Abstract, lines 1-2),

"the component based detection method comprising the steps of: (a) providing a set of training images of the environment" (Page 355, section 3.1, lines 8-27);

"(b) selecting from said set a plurality of training subsets" (Page 351, Section 2.1, lines 8-13, & 3-6, Pages 351-352, bridging paragraph, Figure 2, Page 354, col. 1, lines 1-5 and Figure 4, selecting training subsets corresponds to Mohan's usage of head, leg, arm, etc. images from the plurality of training images), "wherein at least a portion of said training subsets includes positive training images which comprise at least one image portion of at least one person" (Page 354, col. 1, lines 1-5 and Page 352, Figure 2), "wherein each of said positive training images include a characteristic trait different from the characteristic traits of the other training subsets" (See Figure 2 and Page 351, Col. 1, lines 9-12, Mohan's different body part images are used to train only one classifier, different body parts train different classifiers, therefore each body part set differs from the other sets by the body part that is imaged);

"(c) using each said training subset respectively training a plurality of component classifiers to recognize at least a portion of said image of the at least one person in each of a plurality of sub-regions of the region of interest" (See Figure 2 and Page 351, col. 1, lines 9-12, and Page 354, Figure 4, Mohan's first stage classifiers are trained using particular types of body images which are of a particular body part, respectively).

With respect to claim 5, Mohan discloses "wherein at least a portion of said training subsets includes negative training images which do not comprise any image portion of at least one person, wherein each of said negative training images include a characteristic trait different from the characteristic traits of the other training subsets" (Page 354, Col. 1, lines 1-8, and Page 355, Section 3.1, lines 20-22, different characteristic trait corresponds to the negative images lack of people and therefore, body parts).

With respect to claim 6, Mohan discloses "further comprising the step of (d) second training a holistic classifier by combining respective assessments from said component classifiers for providing a global assessment whether the at least one person is present in the region of interest" (Page 351, Section 2.1, lines 5-8, Page 352, Section 2.2.2 & Figure 2, and Page 355, Section 3.1, lines 1-6, holistic classifier corresponds to Mohan's combination classifier).

With respect to claim 7, Mohan discloses "further comprising the step of (e) third training said holistic classifier on substantially all said training images of said set" (Page 355, Section 3.1.1, lines 1-9, training corresponds to Mohan's training of the combination classifier on negative examples also).

With respect to claim 9 Mohan discloses "wherein the number of training images in each said training subset is less than three per cent of the number of training images

in said set" (Page 355, Section 3.1, lines 22-27, Mohan training set comprises

856+9315+866+9260+835+9260+838+9260=40490 total images, the training subsets

comprise 856, 866, 835, and 838, image respectively each of which is less than 3% of

the total number of training images).

With respect to claim 10, Mohan discloses "wherein the number of training

images in each said training subset is less than five per cent of the number of training

images in said set" (Page 355, Section 3.1, lines 22-27, Mohan training set comprises

856+9315+866+9260+835+9260+838+9260=40490 total images, moreover, Mohan's

training subsets comprise 856, 866, 835, and 838, image respectively, each of which is

less than 5% of the total number of training images).

With respect to claim 11, Mohan discloses "wherein the number of training

images in each said training subset is less than ten per cent of the number of training

images in said set" (Page 355, Section 3.1, lines 22-27, Mohan training set comprises

856+9315+866+9260+835+9260+838+9260=40490 total images, the training subsets

comprise 856, 866, 835, and 838, image respectively each of which is less than 10% of

the total number of training images).

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.   **Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mohan et al., "Example-based object detection in Images by Components", published April 2001, [herein Mohan], as applied to claim 7 above and further in view of Schneiderman, U.S. Patent Application No. 2004/0066966, filed 10/07/2002, [herein Schneiderman].**

With respect to claim 7, Mohan fails to explicitly disclose "wherein said (e) third training is performed using an Adaboot algorithm", as claimed, although Mohan does suggests its use on Page 350, Col. 2, Section 1.1.2, by stating that boosting algorithms have been shown to increase performance.

On the other hand Schneiderman teaches "wherein said (e) third training is performed using an Adaboot algorithm" (Col. 11-12, Paragraphs 0139-0147).

It would have been obvious to one of ordinary skill in the art to incorporate the AdaBoost algorithm of Schneiderman into the classification for object detection of Mohan because both Mohan and Schneider are directed to classification structures for object detection, more particularly, both teach the utilization of sub classifiers for training data subsets, and booth are in the same field of endeavor. Furthermore, Mohan has already addressed that boosting algorithms improve performance while Schneiderman provides an explicit teaching. Incorporating Schneiderman into Mohan would have provided the advantage of minimized classification error and maximized between class margins, which are also problems Mohan addresses. Furthermore, Schneiderman's

implementation also overcomes the problem of the increased processing time of typical

AdaBoost algorithms.

10.   Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Trajkovic et al., U.S. Patent Application Pub. No 2003/0112132, published

05/19/2003, [herein Trajkovic], and in view of Mohan et al., "Example-based object

detection in Images by Components", published April 2001, [herein Mohan].

With respect to claim 12, Trajkovic teaches "An automotive collision warning and

avoidance system" (Abstract, and Pages 3-4, Paragraphs 0030-0031).

It is however noted that Trajkovic fails to explicitly disclose the "which performs

the component based detection method of claim 4".

On the other hand Trajkovic as modified by Mohan teaches "which performs the

component based detection method of claim 4" (See rejection of claim 4).

It would have been obvious to one of ordinary skill in the art at the time of

Applicant's invention to incorporate the object detection of Mohan into the Driver's Aid

using image processing of Trajkovic because both are directed to object detection and

specifically detecting people. Moreover, Trajkovic explicitly suggest being programmed

to detect objects such as pedestrians in images and further even teaches the use of a

trained classifier object detection technique. It would have been further obvious to one

of ordinary skill in the art to substitute Mohan's technique for the object detection

suggested by Trajkovic because both are trainable classifier object detection techniques

and Mohan further explicitly states the advantages of being able to detect people in

crowded scenes in which the people may be partially occluded.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to JULIAN D. BROOKS whose telephone number is

(571)270-3951. The examiner can normally be reached on Monday to Thursday EST

7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

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system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Julian D Brooks/   01/16/2010
Examiner, Art Unit 2624

/VIKKRAM BALI/
Supervisory Patent Examiner, Art Unit 2624